APPENDIX I

PROJECT HANFORD LESSONS LEARNED

Title: Contamination Spread Outside of Radiation Control Areas by Fruit Flies

Date: January 7, 1999

Identifier: 1999-RL-HNF-0001

Lessons Learned Statement:

An effective radiological controls program is vigilant in protecting the public, workers, and the environment and is open to the possibility of new mechanisms (such as fruit flies) for spreading contamination.

Glycerin/monosaccharide (simple sugar)-based fixatives used to hold radioactive contamination in place might attract insects that subsequently can spread contamination. The biological vector, fruit flies, had not been identified previously within the DOE Complex and was therefore not considered by operations personnel.

Radioactive contamination can be spread by multiple mechanisms, including plants and animals. Operations must be monitored and controlled to preclude as many of those means as possible. Monitoring must be thorough enough to detect unexpected contamination spread. Response systems must be able to contain and control contamination until the spreading mechanism is determined and controlled.

Public reaction to the spread of contamination off site can be minimized by proactively addressing public health and safety concerns and perceptions through the following:

- Frequent timely status reports to all employees, local news media, and government officials on containment and cleanup efforts
- Monitoring for offsite effects to show that there is no impact to the community. In this event, flying-insect traps were set up outside site boundaries to verify that no fruit flies carried contamination to local crops.
- Bioassays on request
- Surveys of personal effects on request.

Discussion of Activities:

Summary:

Fruit flies spread contamination from a diversion pit located at the Hanford Site's 200 East Area to nearby buildings and to refuse that was then unknowingly transported off site to the City of Richland Landfill. Extensive radiological surveys and testing, including bioassays, showed that no personnel were contaminated.

Details:

On September 10, 1998, Diversion Pit 241-ER-152 was sprayed with a glycerin/ monosaccharide-based fixative to reduce the likelihood of contamination spread during subsequent planned work in that pit. Similar products are used at other sites in the DOE Complex.

On September 15, 1998, while the pit was open to the environment for jumper manipulation, fruit flies were attracted to the fixative, flew into the pit, and laid eggs. The adult flies and their eggs became contaminated. Some fruit flies, probably from the next generation, later followed odors of food and refuse to a nearby temporary construction office, MO-967, where they deposited contamination in the lunchroom, in hallways, on light switches, and in a nearby garbage can and a dumpster.

At 7:45 a.m. on Monday, September 28, 1998, the dumpster at MO-967 was emptied one day ahead of its normal schedule and its contents were taken to the City landfill, the principal disposal site for uncontaminated Hanford Site solid refuse. At 8:45 a.m. that same day, routine radiological surveys revealed contamination in MO-967 and a nearby dumpster. A fact-finding meeting determined that contamination might have been transported to the City landfill. Subsequent surveys detected contamination in two Site garbage trucks, two mobile office trailers, five other buildings, a government van, several other locations, and on the personal belongings of two workers.

Contamination was later found on refuse from the Hanford Site in the City landfill. Environmental permits were obtained to move the contaminated waste back onto the Hanford Site, where it was placed in low-level waste burial grounds.

Analysis:

An investigation team worked aggressively to determine the source of contamination. Fruit flies were suspected early in the incident because of the locations of the initial contamination and because a radiological control technician observed a speck of contamination “fly away.” Flying-insect traps were set to confirm fruit flies as the transport vector. In one extreme instance approximately 260 nanocuries of strontium-90 were found on nine captured fruit flies.

No rapid notification process existed for informing the waste transportation workers to stop hauling refuse.

The root cause of this event was determined to be the failure to establish preventive processes to preclude the transfer of contamination by biological vectors (fruit flies), which led to inadvertent contamination in offsite locations. Additional information about this event can be found online at: <http://www.hanford.gov/safety/conspread/index.html>.

Recommended actions:

Aggressively control biologic transport mechanisms when using glycerin/monosaccharide (simple sugar)-based fixatives for contamination control. Control is particularly important when such fixatives are used in areas open to the environment.

Monitor materials originating from the vicinity of contaminated areas with a graded approach, especially those items destined for offsite disposition.

Biological vector control programs should:

- Consider using fixatives that do not attract animals
- Require routine surveys of areas known to have had contamination spreads by biological transport vectors
- Be integrated with programs of adjacent facilities
- Require dumpsters to be closed when not in use and to have access guards or screens on bottom drainage openings
- Control food substances, including refuse, entering areas near sites known to have potential for contamination spread.

Estimated Savings/Cost Avoidance: The cost of this event is estimated to be at least $2 million.

Priority Descriptor: RED/Urgent (based on the actual spread of contamination off Site)

Functional Categories (DOE): Conduct of Operations; Emergency Management; Environmental Protection; Radiation Protection

Functional Categories (Hanford specific): None

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Keyword(s): contamination, solid waste, gnats, fruit flies, garbage, fixative

References:

Operating Experience Weekly Summaries 98-40 and 98-41

HNF-3628, *Fall 1998 200 East Area Biological Vector Contamination Report DOE This Month*, September 1998

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